

CLAIMS

What is claimed is:

1. 1. A bandgap reference circuit comprising:
2. a transistor having an emitter, a collector, and a base;
3. a first resistor and a second resistor, where the first resistor is coupled
4. between the collector and the second resistor;
5. a proportional to absolute temperature (PTAT) current source for
6. providing a PTAT current, where the PTAT current source is
7. coupled to a node between the first resistor and the second resistor;
8. where a reference voltage is generated at the node between the first
9. resistor and the second resistor.

1. 2. The bandgap reference circuit of claim 1, further comprising:
2. a bias current source for providing a bias current to the transistor.

1. 3. The bandgap reference circuit of claim 1, where the base is coupled to the
2. collector.

1. 4. The bandgap reference circuit of claim 3, where the second resistor couples
2. between the first resistor and ground.

1. 5. The bandgap reference circuit of claim 4, where the emitter is coupled to ground.

1 6. The bandgap reference circuit of claim 1, where the reference voltage remains
2 substantially constant in response to variations in temperature.

1 7. The bandgap reference circuit of claim 1, where the transistor is a bipolar
2 transistor.

1 8. The bandgap reference circuit of claim 7, where the bipolar transistor comprises
2 silicon and germanium.

1 9. The bandgap reference circuit of claim 1, where the bandgap reference circuit is
2 part of a wireless communications device.

1 10. A method for providing a reference voltage, comprising:
2 providing a transistor having an emitter, a collector, and a base;
3 providing a first resistor and a second resistor, where the first resistor is
4 coupled between the collector and the second resistor;
5 providing a proportional to absolute temperature (PTAT) current, where
6 the PTAT current source is received by a node between the first
7 resistor and the second resistor;
8 where a reference voltage is generated at the node between the first
9 resistor and the second resistor.

1 11. The method of claim 10, further comprising:
2 providing a bias current to the transistor.

1 12. The method of claim 10, where the base is coupled to the collector.

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- 1 13. The method of claim 12, where the second resistor couples between the first
- 2 resistor and ground.
- 1 14. The method of claim 13, where the emitter is coupled to ground.
- 1 15. The method of claim 10, where the reference voltage remains substantially
- 2 constant in response to variations in temperature.
- 1 16. The method of claim 10, where the transistor is a bipolar transistor.
- 1 17. The method of claim 16, where the bipolar transistor comprises silicon and
- 2 germanium.
- 1 18. A method for providing a reference voltage, comprising:
 - 2 providing a base-emitter voltage;
 - 3 providing a first current that varies in proportion to the base-emitter
 - 4 voltage;
 - 5 providing a second current that is proportional to absolute temperature
 - 6 (PTAT);
 - 7 routing the first current and a portion of the second current through a
 - 8 second resistor thereby generating a reference voltage V_{ref} that is
 - 9 substantially constant in response to variations in temperature.
- 1 19. The method of claim 18, where:
 - 2 the base-emitter voltage is provided by a transistor having an emitter, a
 - 3 collector, and a base;
 - 4 a first resistor is coupled between the collector and the second resistor;

5 the PTAT current source is received by a node between the first resistor
6 and the second resistor;
7 the reference voltage V_{ref} is generated at the node between the first resistor
8 and the second resistor.

1 20. A bandgap reference circuit comprising:
2 a diode having an anode and a cathode;
3 a first resistor and a second resistor, where the first resistor is coupled
4 between the anode and the second resistor;
5 a proportional to absolute temperature (PTAT) current source for
6 providing a PTAT current, where the PTAT current source is
7 coupled to a node between the first resistor and the second resistor;
8 where a reference voltage is generated at the node between the first
9 resistor and the second resistor.

1 21. The bandgap reference circuit of claim 20, further comprising:
2 a bias current source for providing a bias current to the diode.

1 22. The bandgap reference circuit of claim 20, where the second resistor couples
2 between the first resistor and ground.

1 23. The bandgap reference circuit of claim 20, where the emitter is coupled to ground.

1 24. The bandgap reference circuit of claim 20, where the reference voltage remains
2 substantially constant in response to variations in temperature.